



All-Weather Airport Access Plan 2002-2006

Safety is a major factor influencing a state-wide All-Weather Airport Access Plan. The economic relationship between aviation and communities throughout the state is an added benefit of this plan.

Michigan currently has 234 licensed airports supporting 4.7 million annual operations (see Appendix J for a listing).



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EXECUTIVE SUMMARY

The Michigan Department of Transportation (MDOT) and its Bureau of Aeronautics recognize the importance of enhancing aviation safety by providing an All Weather Airport Access Plan. Additionally, this plan supports the existing aviation industry and stimulates the growth of aviation by making airports more cost-effective to potential business users.

Cities and counties benefit directly and indirectly from air transportation through jobs, tourism dollars, and the relocation and growth of small and medium sized industries. These industries rely on convenient, all-weather access to airports for business, and to serve distant markets.

During periods of low clouds and reduced visibility, an airport can only be used with the aid of instruments which allow flight through the poor weather conditions. By using Instrument Flight Rules (IFR), a pilot can fly an aircraft safely when ceiling and visibility limits do not allow flight by visual means. This enables the pilot to descend to minimum safe altitudes and allows the pilot to see the runway and land safely.

The precision of the navigational landing aids (in the cockpit, on the ground, or in space) determines the minimum altitude and visibility a pilot can safely encounter and still see the runway to land. The higher these minimums, the more frequently a pilot has to divert to an alternate airport during periods of adverse weather conditions. An airport's utility to the business community, as well as other users, is enhanced by increasing the precision of the navigational landing aids available.

Plan Objectives

The following goals and objectives have been defined as a framework for this plan. All goals and objectives are set considering MASP 2000 recommendations.

1. Provide pilots with real time aviation weather observations at the airport for pre-flight planning, and while airborne, to enhance the safety of flight operations.
2. Maximize the development of standard instrument approach procedures to increase the accessibility to more airports during less than ideal weather periods.
3. Develop a data communications network to permit aviation weather data sharing and dissemination.
4. Establish two-way communications between aircraft and FAA facilities.

EXECUTIVE SUMMARY (continued)

Recommendations

All recommendations for this plan are based on criteria described under the plan guidelines. Local sponsor cost-share percentages are as previously approved by the Michigan Aeronautics Commission (MAC) for the All Weather Access Program. A periodic review of goals and objectives shall be completed to maintain plan effectiveness and focus.

The goal of this plan is to ultimately achieve all-weather accessibility for Tier 1 and Tier 2 airports meeting Air Carrier or General Utility airport licensing requirements. Of the 234 licensed public-use airports, 87 are Tier 1 airports (77 - air carrier or general utility), and 25 Tier 2 airports (18 - general utility). Fifty-three of the 95 airports (77 + 18) have achieved all-weather accessibility (51 Tier 1 and 2 Tier 2). (See Appendix E for a list of those airports.) All-weather accessibility for an airport will be achieved when an airport is able to provide the following four services to pilots free of any additional charges:

1. A three-dimensional (3-D) precision instrument approach procedure. (The ultimate goal is a 3-D approach. However, the 3-D GPS program currently being developed by the FAA is experiencing delays, so for the present time, a published instrument approach satisfies this service.)
2. National Weather Service (NWS) and Federal Aviation Administration (FAA) approved current weather observations.
3. Weather dissemination capability.
4. Remote ground communications with Air Traffic Control.

It is the goal of this plan to achieve all-weather accessibility at 100% of the Tier 1 and Tier 2 airports, however, that is not practical. To do that, several airports would need to incur fiscal burdens which they may not be able to handle. These burdens could be due to the need for land purchase, tree clearing, and/or the local share for a weather package. Also, there is the potential for certain Tier 1 or Tier 2 airports not wanting to be all-weather accessible for their own reasons. Therefore, it is the goal to achieve all-weather accessibility at 71 Tier 1 and 2 airports (73%) during the year 2005, and to reach 80% by the year 2008.

This updated plan, when approved by the Michigan Aeronautics Commission, will be used for planning and implementation of the All Weather Airport Access Program for the period 2002 through 2006. Annually, a specific listing of airports proposed for equipment installation will be submitted to the Michigan Aeronautics Commission for approval.

NOTE: All fiscal information contained in this plan is based on FY 2000 dollars. No inflation factor has been applied.

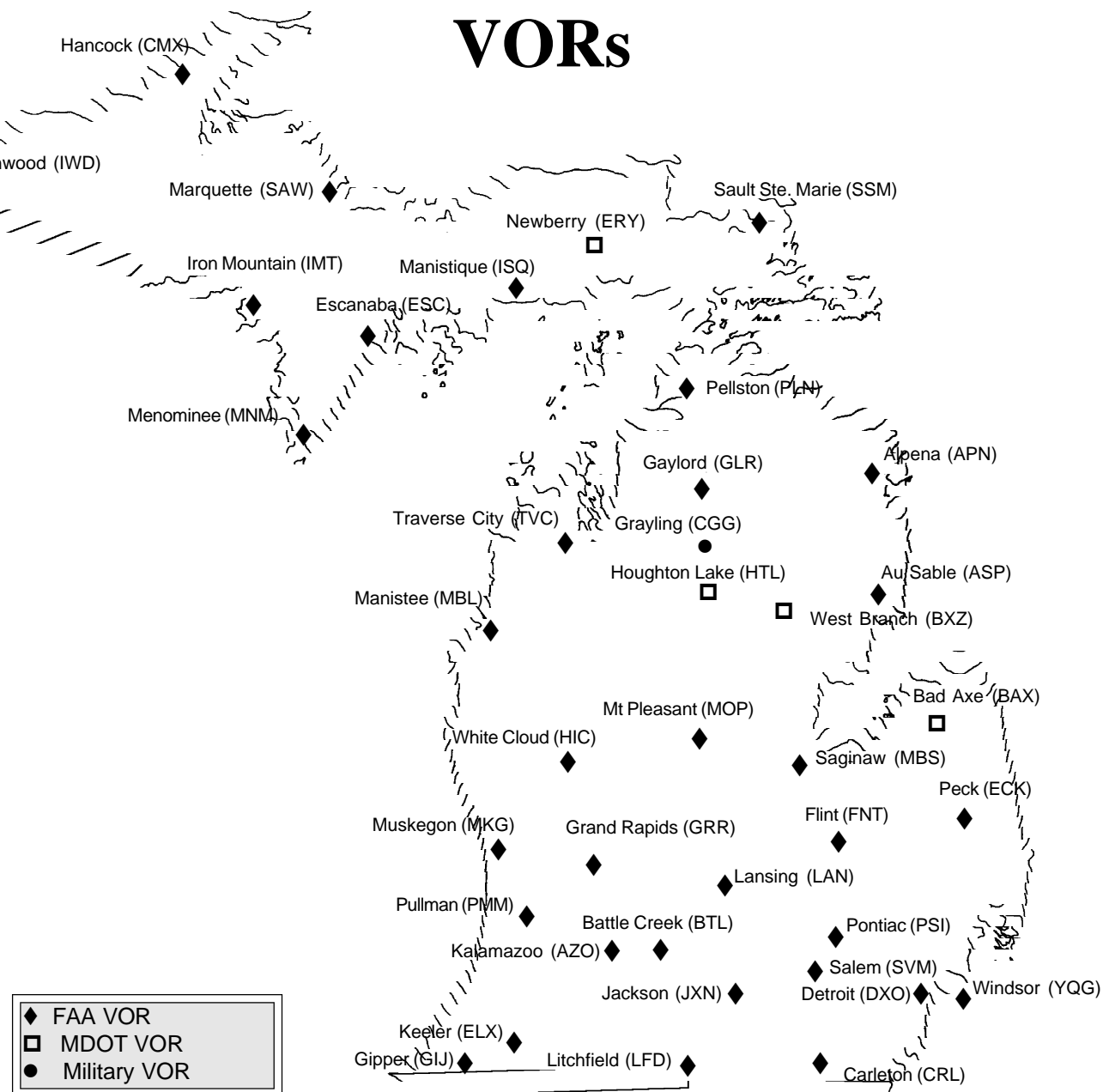
EXISTING SYSTEM STATUS

1. State-wide enroute navigation

Ground Based Navigational Aids: The state owns four Very-high-frequency Omnidirectional Radio ranges (VORs) with Distance Measuring Equipment (DME) at Bad Axe, Houghton Lake, Newberry and West Branch. These systems complement the VORs operated by the FAA to provide enroute navigation in Michigan and an approach landing aid for the airport where the VOR is located as well as other airports within 30 nm of it. There are no plans to add additional VOR sites.

Other Navigational Aids: The Global Positioning Satellite System (GPS) provides 3-D navigational capability throughout the continental United States with accuracies much greater than most ground-based navigational aids. The Federal Aviation Administration has proposed to begin phase-out of ground-based navigational aids in 2008.

It is AERO's objective to provide dependable state-wide enroute navigation down to 1,000 feet above ground level.



EXISTING SYSTEM STATUS (continued)

2. *Instrument approach capability to licensed airports*

The Bureau of Aeronautics is currently working in cooperation with the FAA to develop the next generation of instrument approaches based on GPS. To date, Michigan has 97 airports with instrument approach capabilities, and 43 GPS stand-alone approaches to 32 airports. The cost to Aeronautics would be associated with airport projects to improve or protect approach surfaces--land purchases, tree clearing, etc. (See Appendix F for a listing of all airports with instrument approaches.)

CITY	AIRPORT	RUNWAY	CITY	AIRPORT	RUNWAY
Adrian	Lenawee County	05/23	Ionia	Ionia County	27
Ann Arbor	Ann Arbor Municipal	06/24	Kalamazoo	Kalamazoo/Battle Creek	
Battle Creek	WK Kellogg	05		International	05/23
Bellaire	Antrim County	02	Lakeview	Lakeview Griffith Field	09/27
Big Rapids	Roben-Hood	27	Ludington	Mason County	25
Cadillac	Wexford	25	Mackinac Island	Mackinac Island	26
Coldwater	Branch County Memorial	06	Marlette	Marlette Township	09/27
Detroit	Grosse Ile Municipal	22	Marquette	Sawyer International	19
Drummond	Drummond Island	08/26	Mason	Mason-Jewett	27
Flint	Bishop International	09	Menominee	Menominee-Marinette	32
Frankfort	Dow Memorial	15/33	Romeo	Romeo State	36
Fremont	Fremont Municipal	18	Saginaw	MBS International	5/14/23/32
Grayling	Grayling Army Airfield	14	Saginaw	Saginaw County HW Browne	27
Greenville	Greenville Municipal	28	Sturgis	Kirsch Municipal	18
Harbor Springs	Harbor Springs Municipal	10/28	Three Rivers	Three Rivers Municipal	27
Howell	Livingston County	13	Traverse City	Cherry Capital	36
			Troy	Oakland Troy	09

See Appendix B for GPS Approach Priorities.

EXISTING SYSTEM STATUS

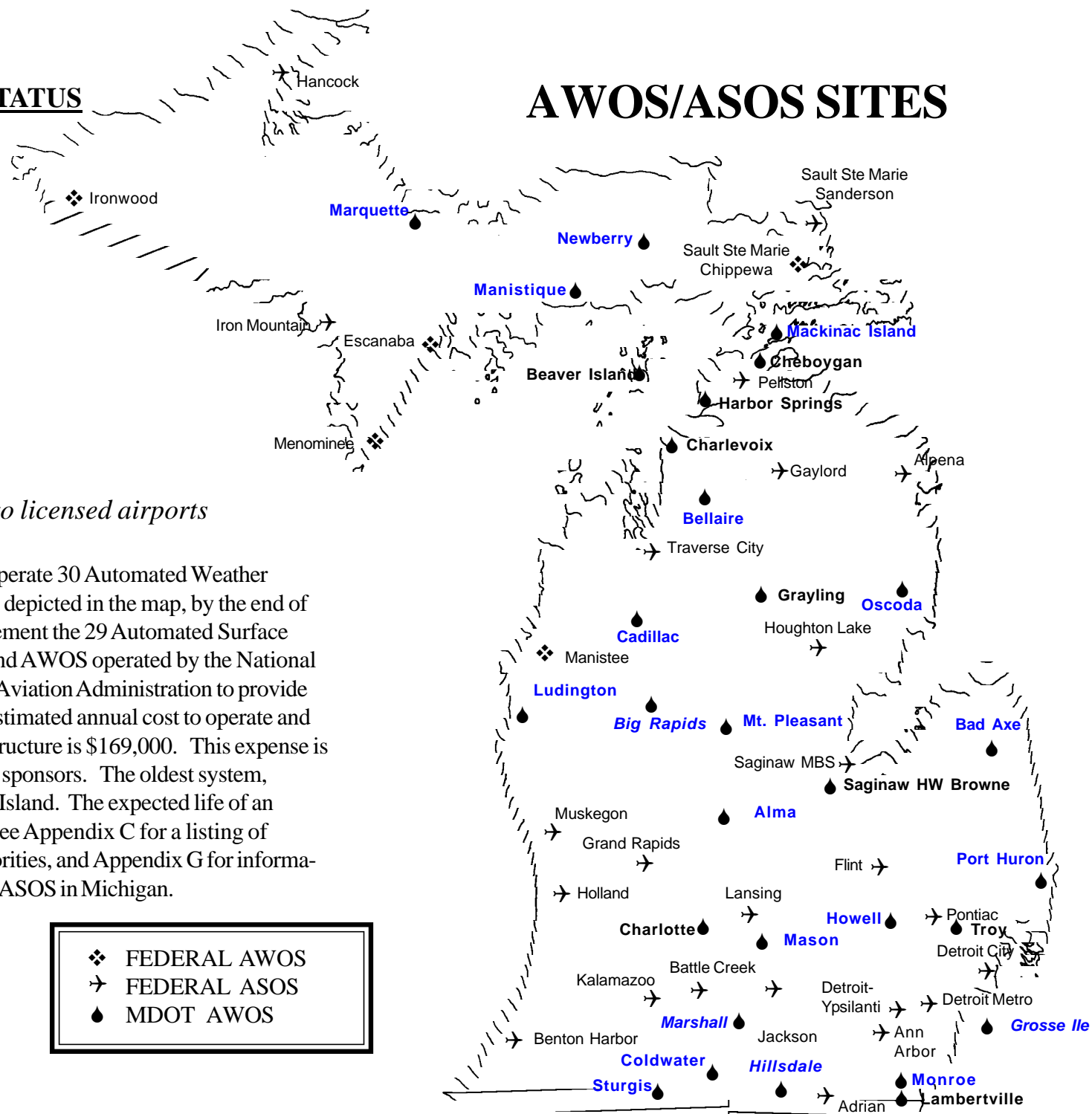
(continued)

3. *All-weather access to licensed airports*

AWOS: MDOT will own and operate 30 Automated Weather Observing Systems (AWOS), as depicted in the map, by the end of FY 2001. These systems complement the 29 Automated Surface Observation Systems (ASOS) and AWOS operated by the National Weather Service and the Federal Aviation Administration to provide current weather observations. Estimated annual cost to operate and maintain the state-owned infrastructure is \$169,000. This expense is split evenly with the local airport sponsors. The oldest system, installed in 1991, is at Mackinac Island. The expected life of an AWOS system is 12-15 years. See Appendix C for a listing of automated weather reporting priorities, and Appendix G for information regarding existing AWOS & ASOS in Michigan.

❖	FEDERAL AWOS
✈	FEDERAL ASOS
●	MDOT AWOS

AWOS/ASOS SITES

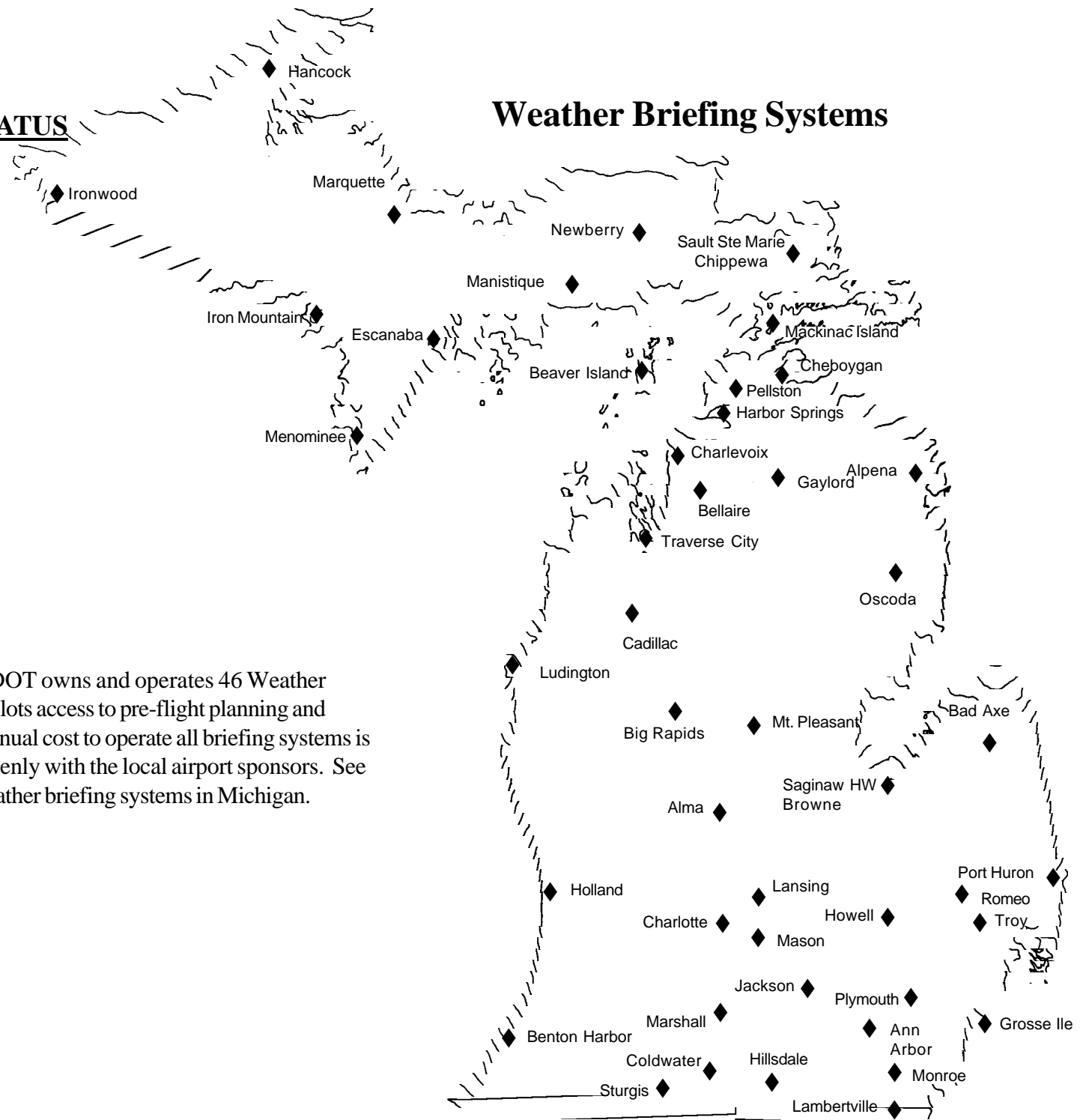


EXISTING SYSTEM STATUS

(continued)

Weather Briefing Systems

Weather Briefing Systems: MDOT owns and operates 46 Weather Briefing Systems. They provide pilots access to pre-flight planning and weather dissemination. Present annual cost to operate all briefing systems is \$118,000. This expense is split evenly with the local airport sponsors. See Appendix H for a list of known weather briefing systems in Michigan.



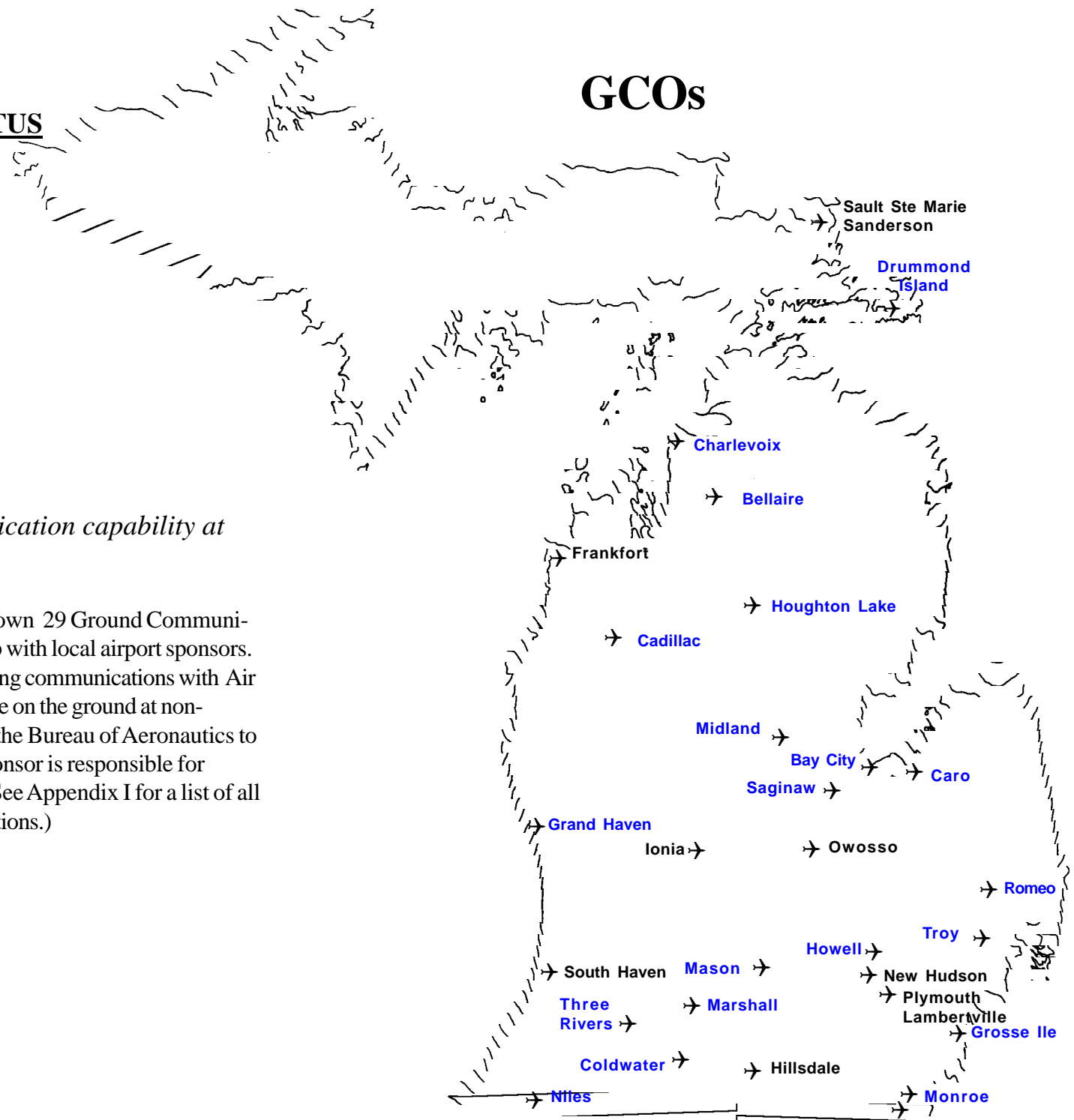
EXISTING SYSTEM STATUS

(continued)

4. *Aircraft cockpit communication capability at licensed airports*

By the end of FY 2001, MDOT will own 29 Ground Communication Outlets (GCOs) in partnership with local airport sponsors. The GCOs assist pilots with establishing communications with Air Traffic Control or Flight Service while on the ground at non-towered airports. There is no cost to the Bureau of Aeronautics to operate these systems. The local sponsor is responsible for operational expenses of the GCO. (See Appendix I for a list of all airports that have remote communications.)

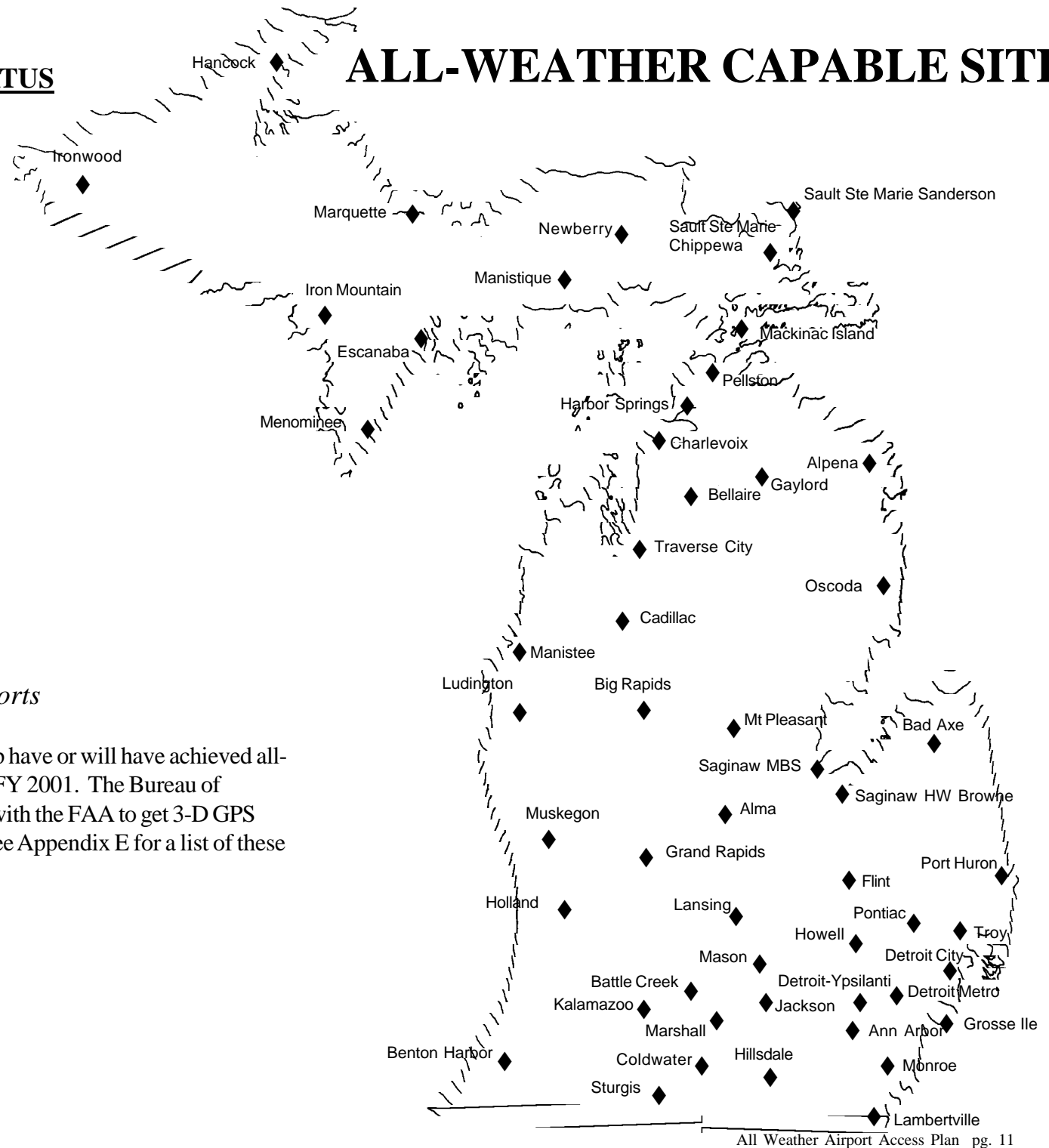
GCOs



EXISTING SYSTEM STATUS

(continued)

ALL-WEATHER CAPABLE SITES



5. All-weather capable airports

The 53 airports depicted on this map have or will have achieved all-weather accessibility by the end of FY 2001. The Bureau of Aeronautics will continue to work with the FAA to get 3-D GPS approaches to all these airports. (See Appendix E for a list of these all-weather capable airports.)

PLAN GUIDELINES

I. CRITERIA FOR INVOLVEMENT BY MDOT

A. Staff Time

1. Airports must be Tier 1 or Tier 2 and licensed as an Air Carrier Airport or as a General Utility Airport.
2. Airports must meet or be willing to meet federal approach standards specified in Federal Aviation Regulations Part 77, Terminal Instrument Procedures (TERPS), and Advisory Circular 150/5300-13.

B. Financial

1. Financial participation by MDOT in any project is subject to availability of state funds. Michigan Aeronautics Commission approval is required for each project and specific terms of the cost-sharing arrangement.
2. The existing cost sharing arrangement is as follows:
 - a. For AWOS equipment, local share is 10% of the cost to purchase and install and 50% of the cost to maintain and operate.
 - b. For weather briefing equipment, local share is 10% to purchase and install and 50% of the cost to maintain and operate.
 - c. For GCO equipment, local share is 0% to purchase and install and 100% of the cost to maintain and operate.

C. Equipment

1. Only systems meeting or exceeding applicable FAA standards will be considered for state use. In addition, systems for ownership, or participation in ownership by the state, will be compatible with federal, International Civil Aviation Organization (ICAO), and MDOT-owned systems.
2. MDOT will not purchase and install any ground based electronic system until it is certified and available for public use and for which airborne receivers are available. This does not preclude involvement in research and development programs.

PLAN GUIDELINES (Continued)

II. CRITERIA FOR PROJECT SELECTION

- A. Tier 1 airports (have a priority over Tier 2 and Tier 3)
- B. Safety Enhancement
- C. Economic Impact (Enable FAR 135 and 121 operations)
- D. Community Commitment
- E. Traffic - itinerant operations, commercial operations, based aircraft and type of aircraft
- F. Airport Facilities - current and projected on the Airport Layout Plan (ALP)
- G. Environmental Factors
- H. Funding - sources and availability
- I. Approaches - existing and planned
- J. Benefit/Cost Formula (FAA Order 7031.2C) - must be 1.0 or greater
Benefit/Cost Ratio for AWOS = $[(A \times B) + (C \times D)]/LCC$

A = GA + Military itinerant operations

B = Sensor costs per itinerant operation - per Order 7031.2C, MDOT uses \$21.49

C = GA + Military local operations

D = Sensor costs per local operation - per Order 7031.2C, MDOT uses \$2.34

LCC = Life Cycle Costs - per Order 7031.2C, fixed cost of \$49,617 plus sum of variable costs unique to applicable sensing devices. MDOT would use \$150,505.

FIVE YEAR PLAN -- FY 2002

1. *STATE-WIDE ENROUTE NAVIGATION*

Presently, there are no plans to further develop the enroute navigation portion of the state system. The FAA plans to begin phase-out of ground-based nav aids in 2008. MDOT will continue supporting state-owned VORs for fiscal year 2002. Projected annual maintenance cost of existing equipment is \$10,000.

2. *ALL WEATHER AIRPORT ACCESSIBILITY*

It is the goal of the Investment Strategy Plan (January 2000) to bring three airports up to all-weather access standards annually. All weather accessibility is considered achieved when the airport has a published instrument approach, reporting of current weather conditions, pre-flight weather dissemination, and ground communications to ATC and/or FSS. Currently, some airports have achieved all weather accessibility, but others lack one or more of these services.

A. *Instrument approach capability*

Partner with the FAA in developing GPS stand-alone approaches.

Continue to submit approach requests to the FAA to be developed for 2-dimensional and 3-dimensional approaches (see Appendix B).

Monitor and evaluate alternative technologies for instrument approach procedures.

Aeronautics is working with the Department of Military Affairs to explore the possibility of replacing the VOR at the Grayling Army Airfield. The new replacement VOR will likely be maintained by AERO personnel.

B. *Weather reporting*

Site and install three AWOS systems and replace aged weather data collection equipment at existing sites, depending on available funding. (This program relies upon an annual funding appropriation, therefore, multi-year funding cannot be guaranteed in advance. New AWOS installations will be done from a priority list (see Appendix C), in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Evaluate outsourcing AWOS maintenance due to staffing considerations.

Total project cost is \$285,000 for purchase and installation of three systems and \$169,000 for operation and maintenance of 33 systems.

Total cost to replace the aged data collection equipment could be \$160,000.

Local sponsor share is 10% for purchase/installation and 50% for operations and maintenance.

C. *Pre-flight weather dissemination*

Install a weather briefing system in conjunction with each AWOS installation.

Evaluate all airports for possible locations of a briefing system where an AWOS/ASOS already exists or where a briefing system would be advantageous without an AWOS (see Appendix A for airports to evaluate).

Projected cost is \$1,125 for purchase and installation of three systems, and \$123,000 for operations and maintenance of 49 systems.

Local sponsor share is 10% for purchase/installation and 50% for operations and maintenance.

D. *Ground communications*

Install GCOs at five locations, depending on available funding. (Since annual funding levels cannot be guaranteed, new GCO installations will be done from a priority list, [see Appendix D], in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Total projected cost for purchase and installation of five systems is \$36,500.

There is no cost to the Bureau of Aeronautics for operation and maintenance. Local sponsor is responsible for operational expenses of the GCO.

3. *EMERGING TECHNOLOGIES*

Continue to monitor the progress of the development of the WxLink Airborne Datalink System, Wide Area and Local Area Augmentation Systems, the Transponder Landing System, and other developments.

4. *PROJECTED PROGRAM COST for FY 2002*

<u>Category</u>	<u>Equipment*</u>	<u>Operations**</u>	<u>TOTAL</u>
Nav aids	\$0	\$10,000	\$10,000
AWOS	445,000	169,000	614,000
Briefing Systems	1,125	123,000	124,125
GCO	<u>36,500</u>	<u>0</u>	<u>36,500</u>
TOTAL	\$482,625	\$302,000	\$784,625

* *Equipment costs based on purchase and installation of 3 AWOS, 3 Weather Briefing Systems and 5 GCOs. AWOS equipment cost includes replacement of data collection equipment*

** *Operations numbers include cost to operate complete state system. AWOS cost includes data collection systems.*

All-weather accessibility is projected to be achieved at 7 airports in FY 2002.

FY 2003

1. STATE-WIDE ENROUTE NAVIGATION

Continue supporting state-owned VORs for FY 2003. Projected cost is \$10,000.

2. ALL WEATHER AIRPORT ACCESSIBILITY

A. Instrument approach capability

Continue to partner with the FAA in developing GPS stand-alone approaches.

Continue to submit approach requests to the FAA to be developed for 3 dimensional and 2 dimensional approaches (see Appendix B).

Monitor and evaluate alternative technologies for instrument approach procedures.

B. Weather reporting

Site and install AWOS systems depending on available funding. (Since multi -year funding cannot be guaranteed in advance, new AWOS installations will be done from a priority list (see Appendix C) in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Due to staffing considerations, continue to evaluate outsourcing AWOS maintenance.

Projected cost is \$380,000 for purchase and installation (based on projection of the installation of four systems) and \$198,000 for operations and maintenance of 37 systems.

Local sponsor share is 10% for purchase/installation and 50% for operations and maintenance.

C. Pre-flight weather dissemination

Install a weather briefing system in conjunction with each AWOS installation.

Continue to evaluate all airports for possible locations of a briefing system where an AWOS/ASOS already exists or where a briefing system would be advantageous without an AWOS (see Appendix A).

Projected cost is \$1,500 for purchase and installation (based on a projection of the installation of four systems) and \$130,000 for operations and maintenance of 53 systems.

Local sponsor share is 10% for purchase/installation and 50% for operation and maintenance.

D. *Ground communications*

Install GCOs in a quantity dependent on available funding. (Since funding cannot be projected, new GCO installations will be done from the priority list, [see Appendix D] in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought before the Michigan Aeronautics Commission for approval.)

Projected cost is \$43,800 for purchase and installation (based on a projection of the installation of six systems.)

There is no cost to the Bureau of Aeronautics for operation and maintenance. Local sponsor is responsible for operational expenses of the GCO.

3. *EMERGING TECHNOLOGIES*

Continue to monitor the progress of the development of the WxLink Airborne Datalink System, Wide Area and Local Area Augmentation Systems, the Transponder Landing System, and other developments.

4. *PROJECTED PROGRAM COST for FY 2003*

<u>Category</u>	<u>Equipment*</u>	<u>Operations**</u>	<u>TOTAL</u>
Nav aids	\$0	\$10,000	\$10,000
AWOS	380,000	198,000	578,000
Briefing Systems	1,500	130,000	131,500
GCO	<u>43,800</u>	<u>0</u>	<u>43,800</u>
TOTAL	\$425,300	\$338,000	\$763,300

* *Equipment costs based on purchase and installation of 4 AWOS, 4 Weather Briefing Systems and 6 GCOs.*

** *Operations numbers include cost to operate complete state system. AWOS cost includes data collection system.*

All-weather accessibility is projected to be achieved at 4 airports in FY 2003.

FY 2004

1. STATE-WIDE ENROUTE NAVIGATION

Continue supporting state-owned VORs for FY 2004. Projected cost is \$10,000.

2. ALL WEATHER AIRPORT ACCESSIBILITY

A. Instrument approach capability

Continue to partner with the FAA in developing GPS stand-alone approaches.

Continue to submit approach requests to the FAA to be developed for 3-dimensional and 2-dimensional approaches (see Appendix B).

Continue to monitor and evaluate alternative technologies for instrument approach procedures.

B. Weather reporting

Site and install AWOS systems depending on available funding. (Since multi-year funding cannot be guaranteed in advance, new AWOS installations will be done from a priority list (see Appendix C) in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Due to staffing considerations, continue to evaluate outsourcing AWOS maintenance.

Projected cost is \$380,000 for purchase and installation (based on projection of the installation of four systems) and \$219,000 for operations and maintenance of 41 systems.

Local sponsor share is 10% for purchase and installation and 50% for operation and maintenance.

C. Pre-flight weather dissemination

Install a weather briefing system in conjunction with each AWOS installation.

Continue to evaluate all airports for possible locations of a briefing system where an AWOS/ASOS already exists or where a briefing system would be advantageous without an AWOS (see Appendix A).

Projected cost is \$1,500 for purchase and installation (based on a projection of the installation of four systems) and \$137,000 for operation and maintenance of 57 systems.

Local sponsor share is 10% for purchase and installation and 50% for operations and maintenance.

D. *Ground communications*

Install GCOs in a quantity dependent on available funding. (Since multi-year funding cannot be guaranteed in advance, new GCO installations will be done from the priority list [see Appendix D] in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Projected cost is \$43,800 for purchase and installation (based on a projection of the installation of six systems.)

There is no cost to the Bureau of Aeronautics for operation and maintenance. Local sponsor is responsible for operational expenses of the GCO.

3. *EMERGING TECHNOLOGIES*

Continue to monitor the progress of the development of the WxLink Airborne Datalink System, Wide Area and Local Area Augmentation Systems, the Transponder Landing System, and other developments.

4. *PROJECTED PROGRAM COST for FY 2004*

<u>Category</u>	<u>Equipment*</u>	<u>Operations**</u>	<u>TOTAL</u>
Nav aids	\$0	\$10,000	\$10,000
AWOS	380,000	219,000	599,000
Briefing Systems	1,500	137,000	138,500
GCO	<u>43,800</u>	<u>0</u>	<u>43,800</u>
TOTAL	\$425,300	\$366,000	\$791,300

* *Equipment costs based on purchase and installation of 4 AWOS, 4 Weather Briefing Systems and 6 GCOs.*

** *Operations numbers include cost to operate complete state system. AWOS cost includes data collection systems.*

All-weather capability is projected to be achieved at 4 airports in FY 2004.

FY 2005

1. STATE-WIDE ENROUTE NAVIGATION

Continue supporting state-owned VORs for FY 2005. Projected cost is \$10,000.

2. ALL WEATHER AIRPORT ACCESSIBILITY

A. Instrument approach capability

Continue to partner with the FAA in developing GPS stand-alone approaches.

Continue to submit approach requests to the FAA to be developed for 3-dimensional approaches (see Appendix B).

Monitor and evaluate alternative technologies for instrument approach procedures.

B. Weather reporting

Site and install AWOS systems depending on available funding. (Since multi year funding cannot be guaranteed in advance, new AWOS installations will be done from a priority list [see Appendix C] in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Due to staffing considerations, continue to evaluate outsourcing AWOS maintenance.

Projected cost is \$380,000 for purchase and installation (based on projection of the installation of four systems) and \$240,000 for operation and maintenance of 45 systems.

Local sponsor share is 10% for purchase/installation and 50% for operations and maintenance.

C. Pre-flight weather dissemination

Install a weather briefing system in conjunction with each AWOS installation.

Continue to evaluate all airports for possible locations of a briefing system where an AWOS/ASOS already exists or where a briefing system would be advantageous without an AWOS (see Appendix A).

Projected cost is \$1,500 for purchase and installation (based on a projection of the installation of four systems) and \$138,000 for operation and maintenance of 61 systems.

Local sponsor share is 10% for purchase/installation and 50% for operation and maintenance.

D. *Ground communications*

Evaluate ground communications at all Michigan airports to determine if more airports need remote communication. Install GCOs, as necessary, in a quantity dependent on available funding. (Since multi-year funding cannot be guaranteed in advance, new GCO installations will be done from the priority list (see Appendix D) in a quantity determined by the available funding. Once exact funding is known, and if specific sites remain, they will be brought annually before the Michigan Aeronautics Commission for approval.)

Projected cost is \$36,500 for purchase and installation (based on a projection of the installation of five systems.)

There is no cost to the Bureau of Aeronautics for operation and maintenance. Local sponsor is responsible for operational expenses of the GCO.

3. *EMERGING TECHNOLOGIES*

Continue to monitor the progress of the development of the WxLink Airborne Datalink System, Wide Area and Local Area Augmentation Systems, the Transponder Landing System, and other developments.

4. *PROJECTED PROGRAM COST for FY 2005*

<u>Category</u>	<u>Equipment*</u>	<u>Operations**</u>	<u>TOTAL</u>
Nav aids	\$0	\$10,000	\$10,000
AWOS	380,000	240,000	620,000
Briefing Systems	1,500	138,000	139,500
GCO	<u>36,500</u>	<u>0</u>	<u>36,500</u>
TOTAL	\$418,000	\$388,000	\$806,000

* *Equipment costs based on purchase and installation of 4 AWOS, 4 Weather Briefing Systems and 5 GCOs.*

** *Operations numbers include cost to operate complete state system. AWOS cost includes data collection systems.*

Due to the limited number of airports that are willing or able to meet the necessary fiscal obligation to achieve all-weather accessibility as of September 2001, it is difficult to project the number that will achieve all-weather accessibility in FY 2005. While three airports are projected, a better prognosis will be determined as the year approaches.

FY 2006

1. STATE-WIDE ENROUTE NAVIGATION

Continue supporting state-owned VORs for FY 2006. Projected cost is \$10,000.

2. ALL WEATHER AIRPORT ACCESSIBILITY

A. Instrument approach capability

Continue to partner with the FAA in developing GPS stand-alone approaches.

Continue to submit approach requests to the FAA to be developed for 3-dimensional approaches (see Appendix B).

Monitor and evaluate alternative technologies for instrument approach procedures.

B. Weather reporting

Site and install AWOS systems depending on available funding. (Since multi-year funding cannot be guaranteed in advance, new AWOS installations will be done from a priority list [Appendix C] in a quantity determined by the available funding. Once exact funding is known, specific sites will be brought annually before the Michigan Aeronautics Commission for approval.)

Due to staffing considerations, continue to evaluate outsourcing AWOS maintenance.

Projected cost is \$380,000 for purchase and installation (based on projection of the installation of four systems), and \$261,000 for operations and maintenance of 49 systems.

Local sponsor share is 10% for purchase/installation and 50% for operation and maintenance.

C. Pre-flight weather dissemination

Install a weather briefing system in conjunction with each AWOS installation.

Continue to evaluate all airports for possible locations of a briefing system where an AWOS/ASOS already exists or where a briefing system would be advantageous without an AWOS (see Appendix A).

Projected cost is \$1,500 for purchase and installation (based on a projection of the installation of four systems), and \$144,000 for operation and maintenance of 65 systems.

Local sponsor share is 10% for purchase and installation and 50% for operation and maintenance.

D. *Ground communications*

By this time in the program, all Tier 1 and Tier 2 eligible airports would have remote communication. Therefore, this planning activity would be completed.

3. *EMERGING TECHNOLOGIES*

Continue to monitor the progress of the development of the WxLink Airborne Datalink System, Wide Area and Local Area Augmentation Systems, the Transponder Landing System, and other developments.

4. *PROJECTED PROGRAM COST for FY 2006*

<u>Category</u>	<u>Equipment*</u>	<u>Operations**</u>	<u>TOTAL</u>
Nav aids	\$0	\$10,000	\$10,000
AWOS	380,000	261,000	641,000
Briefing Systems	1,500	144,000	145,500
GCO	0	0	0
TOTAL	\$381,500	\$415,000	\$796,500

* *Equipment costs based on purchase and installation of 4 AWOS, 4 Weather Briefing Systems and no GCOs.*

** *Operations numbers include cost to operate complete state system.*

Due to the limited number of airports that are willing or able to meet the necessary fiscal obligation to achieve all-weather accessibility as of September 2001, it is difficult to project the number that will achieve all-weather accessibility in FY 2006. While three airports are projected, a better prognosis will be determined as the year approaches.

GLOSSARY

AWOS/ASOS/AWSS: Automated weather observing systems are generally categorized as Automated Weather Observation Systems (AWOS), Automated Surface Observation Systems (ASOS), or Automated Weather Sensors Systems (AWSS). ASOS equipment has been purchased exclusively by the FAA and the NWS, but the contract has expired. The FAA is developing an AWSS program to replace old systems and expand to new locations. MDOT owns 30 AWOS systems which cost approximately \$55,000 per system. Along with AWOS, MDOT has purchased data collection equipment that allows current weather information from all state-owned systems to be collected and sent to the National Airspace Data Interchange Network (NADIN) for distribution to Flight Service Stations, the National Weather Service, and other weather service providers. This data collection equipment costs approximately \$6,500. The cost to install an AWOS is dependent on the airport environment in which it is installed. Installation costs have averaged between \$8,000 and \$15,000 per airport.

GPS: The Global Positioning Satellite System has been available to civilian users since early 1991, and the FAA has been pursuing the concept of making GPS the sole source of navigation in the United States. GPS is able to provide three-dimensional (3-D) guidance with accuracies in the neighborhood of 100 meters (300 feet). Since the accuracy of GPS is not sufficient to allow 3-D guidance for aircraft, the FAA is currently developing and implementing augmentation systems to GPS. One augmentation system is known as the Wide Area Augmentation System (WAAS), which was expected to be equivalent to a Category-I Instrument Landing System (ILS). With WAAS, GPS will provide the FAA with the capability to use 3-D navigation guidance throughout the continental United States up to 100,000 feet. The FAA is also developing a Local Area Augmentation System (LAAS) that will permit very precise aircraft navigational guidance down to the ground, which will be equivalent to Category I and II/III Instrument Landing Systems. If the FAA's plans go according to schedule, ground-based navigational aids will begin to be phased out in 2008. By phasing out these nav aids, the FAA is expected to save millions annually by eliminating the need to maintain antiquated systems.

GCO: Ground Communication Outlets are the cost-effective cousins of the typical Remote Communication Outlets (RCOs). GCOs provide inexpensive communication capability between aircraft on the ground and either an Air Traffic Control (ATC) facility or a Flight Service Station (FSS). A pilot initiates the communication process by keying their microphone four times (for ATC) or six times (for FSS), which causes the GCO to dial the appropriate facility. When the facility answers the phone at their end, the pilot, from the cabin of his aircraft, and the facility can conduct a conversation as if the pilot were using a telephone. By using this process, operational expenses are greatly reduced for the sponsoring airport. GCOs enable pilots to obtain a clearance from ATC prior to getting airborne or close flight plans.

MASP 2000: The Michigan Aviation System Plan 2000 was developed by the Michigan Department of Transportation, through the combined efforts of the Bureaus of Aeronautics and Transportation Planning. The MASP is a tool to guide the development of the state's public-use airports by identifying airport needs in response to the state's goals and objectives.

GLOSSARY (continued)

Weather Briefing System: A Weather Briefing system, formerly known as Pilot Information Center, is the name adopted by the Bureau of Aeronautics for computer-based machines that provide the capability of disseminating current weather conditions for pilots. MDOT supports two machines, the *WeatherMation IV*, manufactured by CLH, Inc., and the *PILOTbrief Vector* machine, manufactured by Weather Services International (WSI). Both systems are capable of providing up-to-the-minute weather updates via satellite communications, as well as NEXRAD weather graphics and the ability to file a flight plan.

Transponder Landing System: The Transponder Landing System (TLS) was designed to meet Category I precision approach standards for all-weather landings to minima of 200 feet decision altitude and 1/2 mile visibility to the airport runway. TLS is especially adaptable to difficult airports that cannot use existing precision approach aids such as the Instrument Landing System (ILS). The FAA is also exploring backup and support technologies for GPS and is considering the TLS. Unfortunately, TLS currently will not be a public approach system, but rather approved only for flight crews who receive special training and are certified to fly that approach. The system requires a ground operator to select the code to match the transponder code of the aircraft wanting to fly the approach. Due to the requirement to match these codes, only one aircraft may be on the approach at any given time.

WxLink: WxLink is a weather data link system in the aircraft, developed by ARNAV Systems Inc., that allows pilots to obtain current graphic and text weather information from the aircraft. The weather information can be superimposed on a moving map displayed in the aircraft and is less than 10 minutes old when received in the cockpit. ARNAV completed their nationwide network in 1998. In addition to weather delivery, services include flight following, dispatch control, 2-way text communications, weather acquisition and down link.